Patent
Attorney Docket No. 1034126-000003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP AMENDMENT**
Glenn Houser	Group Art Unit: 2877
Application No.: 10/625,830	Examiner: Richard A Rosenberger
Filed: July 22, 2003	Confirmation No.: 8963
For: METHOD AND APPARATUS FOR MEASUREMENT OF WAFER OR FILM THICKNESS	

DECLARATION OF GLENN HOUSER PURSUANT TO 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I Glenn Houser declare and state as follows:

1. I am president and founder of Foothill Instruments, LLC of La Canada, California. Foothill Instruments, LLC is a manufacturer of film thickness metrology equipment for semiconductor and related industries.

2. Spectroscopic interferometry as used to measure film thickness has been conceptualized for approximately 100 years and available as a product for more than 30 years. Most of the efforts in creating patents and products in the past 30 years have concentrated on improving accuracy, precision, and the ability to measure thinner and thinner films (as demanded by the semiconductor industry).

3. However, new requirements by the semiconductor industry have created an interest in measuring materials having a thickness of 1 to 1000 microns (i.e., thick layers), and more particularly the thickness of silicon wafers.

4. U.S. Patent Application Serial No. 10/625,830 entitled "Method and Apparatus for Measurement of Wafer or Film Thickness" in which I am the named inventor, utilizes spectroscopic interferometry in this new domain and demand for equipment that can measure materials and films having thickness of 1 to 1000 microns, and where the physical limitations are different from the previous, thin-film domain.

5. In order to measure materials having a thickness of 1 to 1000 microns, an optical spectroscopic measurement system or method requires high resolution spectroscopy, and the core electrical engineering theorems of Nyquist and Whittaker-Shannon, which dictate requirements on the sampling of the signals. In order to correctly model (or recreate) an analog signal such as this measured reflectivity, the sample requires a frequency of at least twice the highest frequency of that signal ("oversampling"). Similar concepts are used in commercial music recordings, with compact disk sampling frequencies of at 44 kHz or greater to perfectly model the 20 kHz upper music frequency. As to the measurement of thick layers, as an example, in order to measure a 500 micron thick silicon wafer, the wavelength steps should be smaller than about 0.2 nanometers at the 1550 nm center wavelength.

6. Reducing the wavelength increment, therefore, increases the thickness which may be measured. However, this is a very different from the case of thin films, which has not been addressed in the prior art. For the thin films, reducing the wavelength increment has the effect of slightly improving the accuracy due to better modeling of the reflectivity data.

7. However, until recently, no practical method of high resolution, infrared spectroscopy existed. The established technology achieves only moderate resolution by use of a broadband source and use of gratings. Thus, the technology failed to measure materials including silicon layers having thicknesses in the range of 1 to 1000 microns. U.S. Patent Application Serial No. 10/625,830 entitled "Method and Apparatus for Measurement of Wafer or Film Thickness" inverts this, utilizing a high resolution, tunable laser source and a broadband detector.

8. The bandwidth of the wavelength range, hence the total number of points, affects the thinnest layer which may be measured and also, to a lesser extent, the accuracy of the measurement. This aspect is similar to the thin-film case. Thus, to measure a 10 micron thick layer of silicon, a wavelength tuning range of about 100 nm is needed.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both,

under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: 28 December 2006 Signed: Glenn Hovemann